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3 SHEETS.
SHEET 1

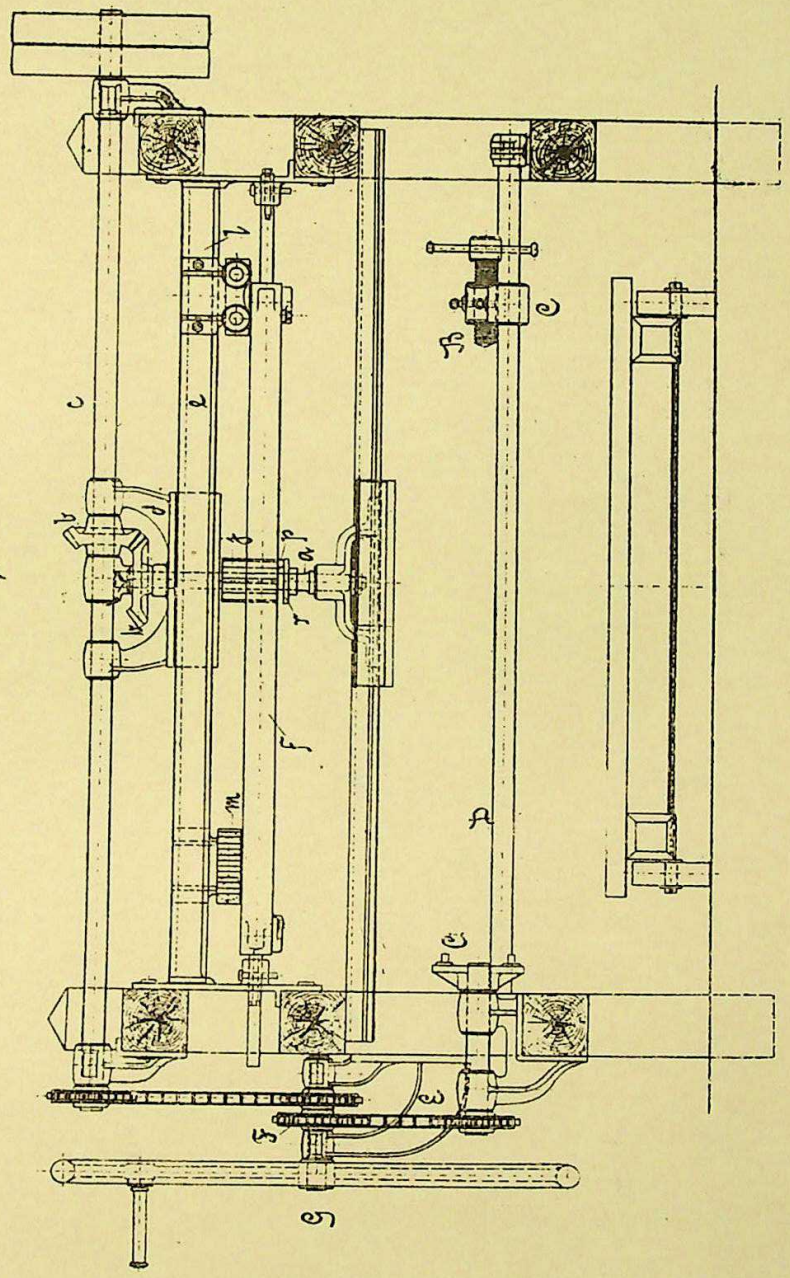


Fig. 1.

A.D. 1894. Jan. 23. N°. 1416.
OSTBERG & another's PROVISIONAL SPECIFICATION.

Fig. 2

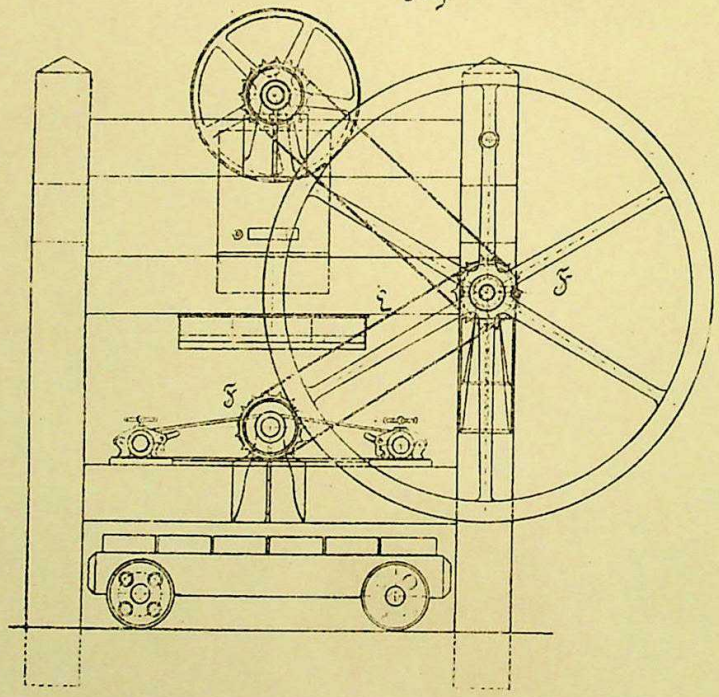
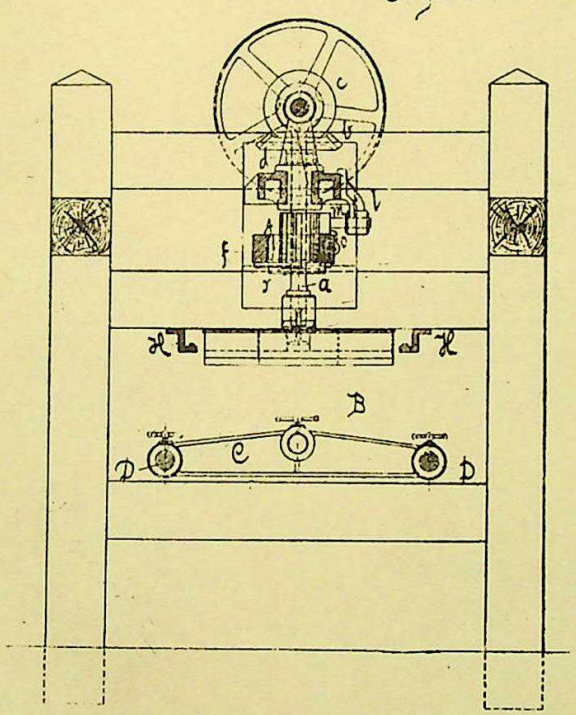


Fig. 3.



Glass and Stone,
Plane Surfaces.

1894 - 1416

A.D. 1894. JAN. 23. N°. 1416.
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(3 SHEETS)
SHEET 3.

Fig. 5

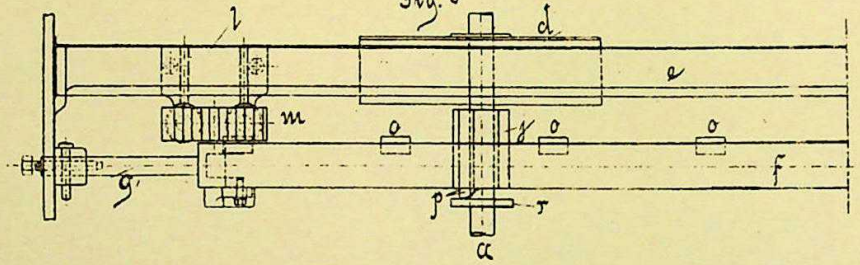
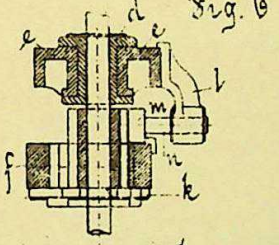


Fig. 6



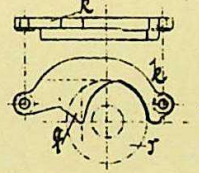
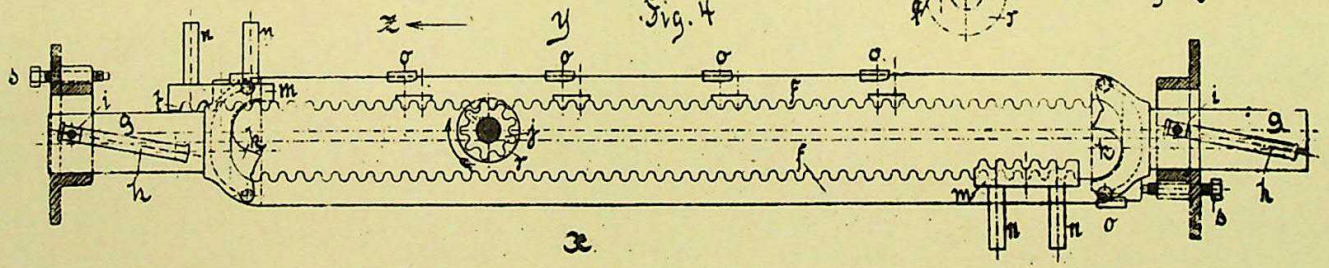


Fig. 7

Fig. 4



Glass and Stone,
Plane Surfaces.

1894 - 1416

51. Grinding & Polishing.
GLASS & STONE.
Plane Surfaces.

Glass + Stone
Plane
27

N° 1416 A.D. 1894

Date of Application, 23rd Jan., 1894

Complete Specification Left, 13th Oct., 1894—Accepted, 29th Dec., 1894

PROVISIONAL SPECIFICATION.

Improvements in Machines for Grinding and Polishing Stones, and in other Machines having a Rack in which Traverses a Rotary Tool Shaft.

We, NILS PETTER ÖSTBERG, Master Stone-mason, and MAGNUS AF KLINTEBERG, Engineer, both in Lund, Sweden, do hereby declare the nature of this invention to be as follows :—

This invention relates to improvements in machines for grinding and polishing stones and in other machines having a rack in which traverses a rotary tool shaft, and has for its object to provide devices whereby the vertical shaft, which carries the tool, is regularly rotated in one direction as well as reciprocated laterally and the reversing effected instantaneously.

And in order that our invention may be more fully understood we have caused to be appended hereunto three sheets of drawings marked with letters of reference indicating like parts in the various figures.

Fig. 1 is a side view, Fig. 2 an end view and Fig. 3 a vertical section of our improved machine for grinding and polishing stones. Figs. 4, 5, 6 & 7 are views of details thereof.

The vertical shaft *a*, which serves for the reception of the tool, is rotated by means of a pair of bevel wheels *b* from the driving shaft *c* having pulleys. The bevel wheel on the shaft *c* is rendered longitudinally movable and is obliged to participate in its rotation through a key employed in the boss of the said wheel, moving in a key bed in the shaft *c*. A bracket *d* which is longitudinally guided upon the rail *e* serves as bearings for the two shafts *a* & *c*. Below the guide rail *e* is a double rack *f* the teeth of which at each end are removed, as shown in Fig. 4. The ends of the racks are formed with flat pivots *g* arranged to move in a corresponding bracket employed at each frame end of the machine; these brackets permit the said rack of moving to and fro. Each of the pivots *g* is formed with a slot *h* inclining in the same direction and receiving respectively a pin *i* fixed to the last named bracket which slot and pin cause the said racks to move at an incline when actuated longitudinally. The rack *f* is in gear with a pinion *j* secured upon the vertical shaft *a* and double the width of the rack *f*, one half projecting above the latter. One of the teeth of this pinion is lengthened downwards. The two rows of rack teeth are formed at such a distance apart from each other that the said pinion can move freely between without coming into contact with the same so as to allow of the shaft *a* being rotated otherwise when retained in a certain position by the bracket *d*. In order to cause the shaft *a* to move to and fro upon the guide rail *e* as required during the grinding and polishing operation the following device is provided. Upon the rail *e* is employed near each end a bracket *l* each of which carries a small rack *m* positioned in close proximity of the upper side of the rack *f* and in pitch and width equal to the latter. Each of the said racks is formed with two pivots *n* received by corresponding holes in the bracket *l* so as to render the racks *m* capable of moving in a horizontal plane, as well as at a right angle to their longitudinal movement. The racks *m* are periodically moved to and fro longitudinally by means of the rack *f* and the projections *o* employed at suitable places

thereon. Upon the lower side of the rack *f* are also employed two projections *k* which have projecting on their upper side opposite the rack *f* tooth like parts *q* in a height equal to that of the lengthened tooth part *p* which projects from the underside of the pinion *j*. Below the pinion *j* is arranged upon the shaft *a* a circular disc *r* which may move freely below the upper part of the projection *k* but capable of abuting against the lower part thereof, for which purpose the said disc is shaped as shown in Fig. 7. The movement takes place in the following manner :—

Assuming that the projections *k* at each end of the rack *f* are in the position as shown in Fig. 4, that the brackets *l* with the racks *m* belonging thereto are in the respective positions and that the rack *f* is as far as possible to the right a position which may be varied by the set screw *s* in order to retain the pinion in proper gear with the rack side *y* ; assuming also that the pinion and the shaft *a* revolves in the direction as indicated by the arrow, the shaft *a* will be obliged to move in the direction of *z* owing to the rack *f* being arrested by the set screw *s*. The rack *m* at the left is so adjusted that its teeth are positioned in a line over the teeth of the rack *f* so that the last tooth of the rack *f* corresponds with the first tooth of the rack *m*. When the pinion engages the first tooth of the rack *m*, the edges of the disc *r* touches the projection *k* and owing to the pinion continuing its rotation along the rack *m*, the rack *f* will be obliged to move in the same direction as the shaft *a*, that is to say towards *z*, by means of the inclined slot *h* and pin *i* the rack *f* is caused to move parallel with the said slots and when the said pinion has reached the last tooth of the rack *m* the lengthened tooth *p* engages the part *q* of the projection *k* and guides the rack *f* completely over, so that the said pinion will then be in gear with the other side of the rack. On reversing, the teeth of the pinion have abuted against the broad tooth *t* on the rack *m*, whereby the rack *m* will be pushed back to such an extent, that the said pinion will not touch it. The rack *f* whilst passing the rack *m* has moved so far to the right, that it abuts against the set screw *s* on that side, pressure thus being exerted against the screw *s* on the further rotation of the shaft *a*. The projection *o* on the right during the movement of the rack *f* has come into contact with the back of the right rack *m* and positions its teeth in a line over the teeth of the rack *f* as previously described. When the shaft *a* has arrived at the right the same movement repeats itself.

To shorten the travel of the shaft *a* two teeth are rendered removable at certain parts on one side of the rack *f* ; by moving the projections *k* on the left as well as the bracket *l* with its rack a change in the direction of the movement can be effected anywhere where the teeth or the rack is rendered removable.

The driving arrangement consists of chains and fly wheel operated either by means of a handle, as shown in the drawings or by straps, in which case the hand driving mechanism is removed.

In order to render the machine capable of grinding or polishing pillars the following device is provided :—

The pillar to be ground or polished is secured between the holder A and the centre B. The centre B with the cross beam C is rendered movable along the rods D to enable the fixing of pillars of different sizes. Rotary motion is imparted to the holder A by means of the chain E and the disc F either from the main driving shaft *c* or from the fly wheel shaft G.

Dated this 22nd day of January 1894.

F. BOSSHARDT & Co.,
Agents to Applicants.

COMPLETE SPECIFICATION.

Improvements in Machines for Grinding and Polishing Stones, and in other Machines having a Rack in which Traverses a Rotary Tool Shaft.

We, NILS PETTER ÖSTBERG, Master Stone-mason, and MAGNUS AF KLINTEBERG, Engineer, both in Lund, Sweden, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention relates to improvements in machines for grinding and polishing stones and in other machines having a rack in which traverses a rotary tool shaft and has for its object to provide devices whereby the vertical shaft, which carries the tool, is regularly rotated in one direction as well as reciprocated laterally and the reversing effected instantaneously.

Reference being made to the drawings filed with our Provisional Specification : Fig. 1 is a side view, Fig. 2 an end view and Fig. 3 a vertical section of our improved machine for grinding and polishing stones. Figs. 4, 5, 6 & 7 are views of details thereof.

The vertical shaft *a*, which serves for the reception of the tool, is rotated by means of a pair of bevel wheels *b* from the driving shaft *c* having pulleys. The bevel wheel on the shaft *c* is rendered longitudinally movable and is obliged to participate in its rotation through a key employed in the boss of the said wheel, moving in a key bed in the shaft *c*. A bracket *d* which is longitudinally guided upon the rail *e* serves as bearings for the two shafts *a* & *c*. Below the guide rail *e* is a double rack *f* the teeth of which at each end are removed, as shown in Fig. 4. The ends of the racks are formed with flat slides *g* arranged to move in a corresponding bracket employed at each frame end of the machine ; these brackets permit the said rack of moving to and fro. Each of the slides *g* is formed with a slot *h* inclining in the same direction and receiving respectively a pin *i* fixed to the last named bracket which slot and pin cause the said racks to move at an incline when actuated longitudinally. The rack *f* is in gear with a pinion *j* secured upon the vertical shaft *a* and double the width of the rack *f*, one half projecting above the latter. One of the teeth of this pinion is lengthened downwards. The two rows of rack teeth are formed at such a distance apart from each other that the said pinion can move freely between without coming into contact with the same so as to allow of the shaft *a* being rotated otherwise when retained in a certain position by the bracket *d*. In order to cause the shaft *a* to move to and fro upon the guide rail *e*, as required during the grinding and polishing operation, the following device is provided.

Upon the guide rail *e* is employed near each end a bracket *l* each of which carries an auxiliary rack *m* positioned in close proximity of the upper side of the rack *f* and in pitch and width equal to the latter. Each of the said racks is formed with two studs *n* received by corresponding holes in the bracket *l* so as to render the racks *m* capable of moving in a horizontal plane at right angles to the length of the rack. The racks *m* are periodically moved to and fro horizontally by means of the rack *f* and the projections *o* employed at suitable places thereon. Upon the lower side of the rack *f* is employed at each end a plate *k* formed with a tooth *q* in height equal to the tooth part *p* which projects from the underside of the pinion *j*. Below the pinion *j* is arranged upon the shaft *a* a circular disc *r* which may move freely below the tooth *q* of the plate *k* but capable of abuting against the side of the latter, for which purpose the said disc is shaped as shown in Fig. 7. The movement takes place in the following manner.

Assuming that the plates *k* on the rack *f* and the brackets *l* carrying the racks *m*

are positioned as shown in Fig. 4, and that the rack *f* is as far as possible to the right, a position which may be varied by the set screw *s* in order to retain the pinion in proper gear with the rack side *y*; assuming also that the pinion *j* and the shaft *a* revolve in the direction indicated by the arrow, the shaft *a* will be obliged to move in the direction of *z* owing to the rack *f* being arrested by the set screw *s*. At this time the rack *m* at the left is positioned with its teeth in a line with the teeth of the rack *f*, the last tooth of the rack *f* corresponding with the first tooth of the rack *m*. When the pinion engages the first tooth of the rack *m*, the periphery of the disc *r* contacts with the plate *k* and continuing its rotation in the rack *m* pushes the rack *f* in the same direction as the shaft *a* travels, that is to say, towards *z*. By means of the inclined slot *h* and pin *i* the rack *f* is then caused to move parallel with the said slots and when the said pinion has reached the last tooth of the rack *m* its lengthened tooth *p* engages the tooth *q* of the plate *k* and guides the rack *f* completely over, so that the said pinion will then be in gear with the other side of the rack. On reversing, the teeth of the pinion abut against the broad tooth *t* on the rack *m*, whereby the rack *m* will be pushed back out of gear with the said pinion. The rack *f* then moves to the right, until it abuts against the set screw *s* on that side. The projection *o* on the right during the movement of the rack *f* comes into contact with the back of the right rack *m* which pushes the latter forward bringing its teeth in a line over the teeth of the rack *f*. The shaft *a* afterwards arriving at the right repeats its movement as previously described.

To shorten the travel of the shaft *a* two teeth are rendered removable at certain parts on one side of the rack *f*, by moving the projections *k* on the left as well as the bracket *l* with its rack a change in the direction of the movement can be effected anywhere where the teeth or the rack is rendered removable.

The driving arrangement consists of chains and fly wheel operated either by means of a handle, as shown in the drawings or by straps, in which case the hand driving mechanism is removed.

In order to render the machine capable of grinding or polishing pillars the following device is provided.

The pillar to be ground or polished is secured between the holder A and the centre B. The centre B with the cross beam C is rendered movable along the rods D to enable the fixing of pillars of different sizes. Rotary motion is imparted to the holder A by means of the chain E and the disc F either from the main driving shaft *c* or from the fly wheel shaft G.

Having now particularly described and ascertained the nature of our invention and in what manner the same is to be performed we declare that what we claim, is—

1st. In machines for grinding and polishing stones and in other machines having a rack in which traverses a rotary tool shaft, the employment of a double rack *f*, the rows of teeth of which are positioned opposite to each other and are lengthened at each end by means of auxiliary racks *m* rendered movable at a right angle to the double rack *f* and the latter longitudinally and laterally by such as the slides *g*, *h*, and brackets carrying the studs *i*, *i*, for the purpose of causing the tool shaft *a* on its traverse to automatically move the rack *f* longitudinally in either direction as well as laterally and thus bring the tool shaft pinion in and out of gear with each side of the double rack *f*, all substantially as set forth.

2nd. In the machine specified in Claim I for the purpose of effecting the said automatic longitudinal movement of the double rack *f* in the direction of the shaft axis and parallel thereto, the employment of a plates *k* upon the underside of the rack *f* near each end having a tooth *q* positioned between the two rows of teeth and the pinion *j* of the tool shaft *a*, a lengthened tooth *p* which operates in conjunction with the tooth *q*, the tool shaft *a*, a circular disc *r* operating in conjunction with the plate *k*, projections *o*, on the double rack *f* adapted to move the auxiliary racks *m* into the path of the tool shaft *a* so that the tool shaft *a* with its circular disc *r* will abut against the plate *k* and the lengthened tooth *p* of the pinion *j* act

upon the tooth *q*, when arriving at the rack end and whilst passing onto the auxiliary rack, and thus bring the double rack laterally in its final position, all substantially as set forth.

3rd. In the machine specified in Claim I, the employment of a bracket *d* rendered movable upon the driving shaft *c* preferably guided upon a rail *e* or the like and in which the shaft of the grinding or polishing or the like tool is mounted, and two shafts *c* & *a* are geared up by means of the bevel wheels *b* one of which is rendered longitudinally movable upon the shaft *a* in order to impart rotary motion to the latter and permit of a to and fro motion, all substantially as set forth.

4th. In a machine as specified in Claim I, the employment below the path of the tool shaft *a*, of a holder A which may be interchanged and is rotated from the driving shaft or by bevel wheels and a centre B opposite thereto rendered adjustable upon a cross piece C supported by rods D for the purpose of permitting the fixing and rotating of a round stone object, as for instance, a pillar and the like, below the tool, all substantially as set forth.

Dated this 12th day of October 1894.

F. BOSSHARDT & Co.,
4, Corporation Street, Manchester, Agents to Applicants.

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